NON-PUBLIC?: N
ACCESSION #: 9405090235
LICENSEE EVENT REPORT (LER)

FACILITY NAME: Nine Mile Point Unit 1 PAGE: 1 OF 05

DOCKET NUMBER: 05000220

TITLE: Reactor Scram Caused by Main Generator Trip as a Result
of a Failed Output Breaker Protective Relay
EVENT DATE: 04/05/94 LER #: 94-002-00 REPORT DATE: 05/05/94

OTHER FACILITIES INVOLVED: N/A DOCKET NO: 05000

OPERATING MODE: N POWER LEVEL: 100

THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR SECTION:
50.73(a)(2)(iv)

LICENSEE CONTACT FOR THIS LER:
NAME: Mr. Kenneth Sweet, Manager Technical TELEPHONE: (315) 349-2462
Support NMP1

COMPONENT FAILURE DESCRIPTION:
CAUSE: X SYSTEM: FK COMPONENT: 21 MANUFACTURER: G080
REPORTABLE NPRDS: N

SUPPLEMENTAL REPORT EXPECTED: No

ABSTRACT:

On April 5, 1994 at 0451 hours, Nine Mile Point Unit 1 (NMP1) received an automatic scram initiation signal resulting in a full reactor scram. While preparing for maintenance on the #9 345KV line disconnect switch, breaker R925 was opened, at which time the #8 line breaker R915 tripped unexpectedly. This resulted in a main generator trip and full reactor scram. At the time of the event, the plant was operating at 100 percent of rated thermal power.

The apparent root cause of this event was an electrical short in the polarizing circuit within the distance directional relay 21B-1.

Immediate operator actions included commencing scram recovery activities and initiating a controlled plant cooldown. Additional corrective actions include: 1) replacing the faulty relay; 2) verifying the correct

operation of a similar relay; and 3) training operators to identify the precursor to this event.

END OF ABSTRACT

I. DESCRIPTION OF EVENT

On April 5, 1994 at 0451 hours, Nine Mile Point Unit 1 (NMP1) received an automatic scram initiation signal resulting in a full reactor scram. While preparing for maintenance on the #9 line disconnect switch, the #9 line 345KV breaker R925 was opened, at which time the #8 line breaker R915 tripped unexpectedly. This resulted in a main generator trip and full reactor scram. At the time of the event, the plant was operating at 100 percent of rated thermal power.

In preparation for work on switch 926, 345KV line #9 was being removed from service by opening breaker R925 from the NMP1 Control Room. At the instant breaker R925 was opened, breaker R915 tripped open. With both breakers R925 and R915 open, the load was removed from the main turbine/generator tripping relay 86G2 which caused a turbine stop valve closure and subsequent reactor scram.

Following the scram, High Pressure Coolant Injection (HPCI) initiated as expected and recovered reactor vessel water level from a low of 34 inches indicated to a peak of 108 inches indicated (the top of active fuel is at -84 inches indicated).

The turbine trip from high power caused a pressure transient which resulted in all six Electromatic Relief Valves (ERVs) opening as expected. The individual ERVs remained open from two to four seconds. This caused torus water temperature to rise approximately 2 degrees Fahrenheit.

When the Control Room operators performed the verification of all control rods fully inserted, two did not indicate full in on the full core display or the computer printout of rod positions. The full-in position of the two rods (42-19 and 34-35) was verified by confirming that the "all-rods-in" relays were energized.

Post-incident review revealed that the scram insertion times of two of the eight measured control rods were found out of tolerance. Work orders were issued to correct the problem with control rods 14-43 and 22-43.

The reactor scram occurred at 0451 hours on April 5, 1994, and the scram

was reset at 0453 hours.

II. CAUSE OF EVENT

A root cause investigation was performed utilizing Nuclear Interfacing Procedure NIP-ECA-01, "Deviation/Event Report." The apparent root cause of this event was an electrical short across the Phase 1 polarizing circuit capacitor (C21). With the capacitor

II. CAUSE OF EVENT (cont.)

shorted, the restraint voltage of the 21B-1 relay was not sufficient to hold the Phase 1 contact open during normal plant operation, resulting in the contact failing closed.

The circuit design is such that, when R925 was opened, auxiliary contacts in the breaker changed state, completing the trip logic for a simultaneous turbine trip signal and re-opening of R925.

While operators routinely check protective relays for trip flag conditions, this pre-trip condition was not detected because this relay does not display a trip Rag unless it experiences a valid fault signal. However, with close inspection of the relay contacts, it is possible to ascertain contact position, and as a preventive measure for future planned breaker operations, contact verification will be included as a corrective action as
discussed in Section IV.

The two most probable causes of the short across C21 are a degraded capacitor or a short in the polarizing circuit. Capacitor C21 was removed from the relay and bench tested. The capacitor tested satisfactorily on the bench, even when heated with a heat gun. An examination of the capacitor internals revealed no abnormalities. The relay, itself, was then examined in an attempt to identify any conditions which may have caused a short across C21. Nothing within the relay was discovered which may have caused the short.

When the relay was removed from its relay case for bench testing, the physical condition of the relay was, of course, disturbed. This action may have removed the short. Also, this particular type of relay exhibits elevated internal temperatures at normal operating conditions. This may have contributed to a temporary short within the relay circuitry which would have cleared after the relay was allowed to cool.

Since no defective components or conditions could be found which would have resulted in a short across C21, the relay was not returned to service and a replacement relay was installed.

III. ANALYSIS OF EVENT

This event is reportable in accordance with 10CFR50.73 (a)(2)(iv), which requires Licensees to report "any event or condition that resulted in a manual or automatic actuation of any Engineered Safety Feature (ESF), including the Reactor Protection System (RPS)."

III. ANALYSIS OF EVENT (cont.)

The full reactor scram was the design response of the RPS to a main turbine/generator stop valve closure with the plant at 100 percent power. The HPCI mode of the feedwater system initiated to maintain reactor vessel water level as designed. The ERVs lifted, as designed, to prevent an overpressure condition. This reactor scram event was less severe and bounded by the Electrical Load (Generator Trip) Transient analysis in Chapter XV of the NMP1 FSAR.

The control rod indication problem did not affect the severity of this event. The slower scram times of two control rods were within the analyzed conditions for this event.

There were no adverse safety consequences as a result of this event. No systems or components were inoperable that contributed to the severity of this event. The reactor scram posed no threat to the health and safety of the general public or plant personnel.

IV. CORRECTIVE ACTIONS

The immediate corrective actions were for operators to perform the scram recovery actions, place the plant in a stable condition, and determine the cause of the scram.

Additional corrective actions include:

1. A Deviation/Event Report (DER 1-94-0638) was issued to track the event, the LER, and any corrective actions.

2. The faulty 21B-1 relay was replaced.

3. Corresponding relay 21B-2 for breaker R925 was tested and verified

operable (there are no other similar type relays installed at NMP1).

4. Operators will be trained to verify correct protective relay contact position prior to planned 345KV breaker manipulation.

V. ADDITIONAL INFORMATION

A. Failed components:

Distance directional relay 21B-1, General Electric 12CEY15A5A

B. Previous similar events:

There have been previous scrams caused by main turbine/generator trips, however, none has involved failure of the distance directional relays.

C. Identification of components referred to in this LER:

COMPONENT FUNCTION	IEEE 803 EIIS SYSTEM	IEEE 805 ID
345KV Output	N/A	FK
Reactor Protection System	N/A	JC
Main Turbine/Generator	N/A	TA
Main Feedwater System	N/A	SJ
High Pressure Coolant Injection System	N/A	BJ
Reactor Pressure Vessel	N/A	SB
Distance Directional Relay	21	FK
Breaker	BRKR	FK
Switch	89	FK
Relief Valve	RV	SB
Control Rod	ROD	SB

NIAGARA
MOHAWK

NIAGARA MOHAWK POWER CORPORATION Nine Mile Point Nuclear Station Unit# 1,
P. O. Box 63, Lycoming, NY 13093

Richard B. Abbott
Plant Manager

(315) 349-1812
(316) 349-4417 (FAX) May 5 , 1994
NMP90149

United States Nuclear Regulatory Commission
Document Control Desk
Washington, DC 20555

RE: Docket No. 50-220
LER 94-02

Gentlemen:

In accordance with 10CFR50.73 (a)(2)(iv), we are submitting LER 94-02, "Reactor Scram Caused by a Main Generator Trip as a Result of a Failed Output Breaker Protective Relay."

A telephone report of this event was made in accordance with 10CFR50.72 (b)(2)(ii) at 0726 hours on April 5, 1994.

Very truly yours,

R. B. Abbott
Plant Manager - NMP1

RBA/RLM/lmc
Attachment

xc: Mr. Thomas T. Martin, Regional Administrator, Region I
Mr. Barry S. Norris, Senior Resident Inspector

*** END OF DOCUMENT ***